



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PLEASANTNESS AND UNPLEASANTNESS IN RELATION TO ORGANIC RESPONSE

By PAUL THOMAS YOUNG, Ph. D., The University of Minnesota

In a previous study¹ of mixed feelings we came to the conclusion that pleasantness and unpleasantness are not felt simultaneously but only in alternation. This incompatibility indicates the existence of two opposed physiological mechanisms which are involved in affective response.

We have thought that a comparative study of the organic-kinaesthetic processes of pleasant and unpleasant feeling might throw light upon the nature of affective opposition. Accordingly we have taken for an experimental problem the following: is there any characteristic difference between the organic-kinaesthetic factors of P and U feeling which may throw light on the physiological mechanism of affection?

We have evoked feelings by simple, single stimuli: odors, tastes, tactual impressions, and a few chords. The feelings aroused vary intensively between the mild aesthetic feelings and strong emotion. Following is a complete list of the stimuli used:

Olfactory: wintergreen; caproic acid; creosote; castor oil; white rose perfume; asafœtida; cod liver oil; nitro-benzole; peppermint odor; camphor; anise; violet perfume; heliotrope perfume. *Gustatory*: vinegar; castor oil; chocolate peppermint candy; sarsaparilla; salted almond. *Tactual*: stroke with velvet; tickle ear; slap with lamella; sandpaper chin and nose; snap on cheek with rubber band; pain from sharp nail; extension of arm for 60 sec. *Auditory*: chords and discords.

The subject was seated in a Morris chair, eyes closed, in a room specially prepared for the experiment. Every S worked two hours a week, at approximately the same time of day; a single session took from $\frac{1}{2}$ to $\frac{3}{4}$ of an hour. The work was done during the winter of 1919-20, and was broken by the Christmas holidays.

The following instruction was finally adopted after several slight modifications:

¹ Young, P. T., An Experimental Study of Mixed Feelings, *Am. Jour. of Psychol.*, 1918-19, 237-271.

PLEASANTNESS, UNPLEASANTNESS & ORGANIC RESPONSE 39

"In this experiment be passive and receptive. Let the experimental situation have its full normal effect upon you.

"Report all muscular tendencies and organic sensations in any way related to the affective reaction.

"Report whether the experience was pleasant, unpleasant, or indifferent; and indicate the intensity of the feeling (using, for example, such terms as 'very weak,' 'weak,' 'moderate,' 'strong,' 'very strong')."

Our subjects were five men and two women, all connected with the psychology department at the University of Minnesota.² We shall designate these subjects by letter: A, B, C, D, E, F, G.

TABLE I
TOTAL NUMBER OF REPORTS

Subject	A	B	C	D	E	F	G	Total
Pleasantness	25	17	12	6	27	26	9	122
Indifference*	19	6	12	2	14	4	13	70
Unpleasantness . .	34	29	8	8	41	17	11	148
Total	78	52	32	16	82	47	33	340

*"Indifference" includes all reports in which pleasantness and unpleasantness are not specifically mentioned, as well as those in which the experience is described as indifferent.

RESULTS

The total number of reports in the experiment is shown in Table I. It will be noticed that there is a good balance between P (122) and U (148).

Of the specific organic-kinaesthetic processes reported by our subjects the most frequent are:

Muscular strain, tension, shivers, shocks, jumps, moving waves of sensation; relaxation; incidental movements such as chewing, swallowing, tongue movements, jaw movements, eye movements, special associated movements, etc.; warmth, colds, pressures referred to the chest, heart and trunk; observed changes in respiration and circulation; perception of passive movement, of the flow of saliva, of tendency to vocalize; kinaesthesia of amusement, smiling, frowning; anger, expectation, surprise, nausea, sneezing, snarling, etc.

Correlations.—A preliminary survey of our data shows clearly that P and U are frequently reported without any mention whatsoever of organic and kinaesthetic accompani-

² The subjects were: Dr. R. M. Elliott; Dr. (Miss) M. Fernald; Dr. (Mrs.) J. C. Foster; Dr. W. S. Foster; Dr. J. J. B. Morgan; Mr. O. P. Pearson; Mr. C. P. Stone.

ments. Of course there may be subliminal physiological changes accompanying every P and U feeling which, conceivably, might be detected by an ultra-refined expressive method. However, peripheral changes were not observed by our subjects in a large number (38%) of reports. We conclude that there is no sensory *sine qua non* of P and U.

Consequently we must limit our investigation to reports containing specific mention of organic-kinaesthetic processes. Apparently there are a few specific correlations generally recognized in daily life. Smiling, for example, appears to be correlated with P; frowning and snarling with U; nausea (3 cases) with U, etc. There is also a suggestion of correlations between P and U and changes in respiration. However, no conclusions can be drawn safely from our data, and the correlations in question are best studied by the physiological methods.

If, however, we examine the reports more closely, we find a general correlation-tendency of considerable interest. Muscular strain (tension) is correlated with U, while its opposite, relaxation, is correlated with P. In 28 reports strain is associated with U feeling, and in 31 muscular relaxation is associated with P. The distribution of these reports is shown in Table II. This result confirms previous work.³

Following are sample reports in which muscular strain (tension) is associated with U:

TABLE II

MUSCULAR STRAIN AND RELAXATION IN RELATION TO PLEASANTNESS AND UNPLEASANTNESS

Subject	A	B	C	D	E	F	G	Totals
Strain with Unpleasantness.....	7	8	0	5	0	7	1	28
Strain with pleasantness.....	0	2	0	0	0	1	0	3
Relaxation with Pleasantness.....	6	0	7	3	3	12	0	31
Relaxation with Unpleasantness...	0	0	0	0	0	0	0	0
Total Reports.....	78	52	32	16	82	47	33	340

³ Hayes, S. P., A Study of the Affective Qualities, *Am. Jour. of Psychol.*, Vol. 17, 1906, 358-393. "For all observers alike, . . . judgments of strain were easy and, on the whole, direct. Strain was, however, described in 'muscular' terms throughout, and increasing strain meant, uniformly, increasing unpleasantness." Three of Hayes' subjects make relaxation the opposite of unpleasant strain and the curves are curves of pleasantness; one other subject considers relaxation a pleasurable muscular attitude or a pleasurable organic set.

"U. mildly so . . . I noticed that my hands were crossed quite tightly with a tension that increased slightly." A 29. "That was distinctly U. There was quite a foreperiod of apprehension—a straining." A 41. "It was U, meaning that there was some tension in the muscles around the nose, possibly tending to curl it up and withdraw it." A 65. "That is U but one's main interest is in balancing the strains all over the body." A 67. "That was U, rather unexpectedly so . . . Quite a degree of tension as compared with the muscle position assumed for P and relaxing stimuli." A 71. "There was the usual degree of tension that characterizes the foreperiod of expecting U as I did then. The tension there seemed to be lateral where the tension for the U odor seemed to be vertical." A 72. "That was U. I didn't notice any particular kinaesthesia except a slight tightening of the muscles of the lower part of the nose and the upper part of the lip." B 13. "Decidedly U. . . Tightening up of the eyes—a tense closing of them." B 23. "It was U. Quite a noticeable tightening of the muscles in the lower part of the face. It seemed to be the reverse of sniffing—the attempt to prevent air from coming in." B 25. "U . . . Only a very slight tendency to tighten the muscles about the nostrils." B 27. "I should say U, but very weak . . . Tightening of the muscles about the trunk." B 40. "U, strong. Tendency to shut off the breathing. Tendency to draw head away which was inhibited by the experimental situation. Tightening of muscles about the nose. Drawing together of muscles between the brows—a slight scowl." B 42. "Very faintly U. I didn't notice anything more than a slight tensing of the muscles concerned with smelling." B 46. "I should say very weakly U. I think there was some tenseness of the muscles about the nose and thorax." B 47. "That was U, rather moderately . . . First a little excitement, a little tension of the muscles." F 2. "A sudden tensing of the muscles as soon as you struck my cheek . . . It was U, though not so very U either, mostly surprise and tensing of the muscles in the right arm and also jerking away from where you struck." F 4. "Muscles had a tendency to contract. Face frowned . . . Very U." F 24. "A tendency to make muscles more tense. It was indifferent, or if anything weakly U." F 32. "Definite tensing of the muscles, pulling away to the side, turning of the head . . . Very U" F 44. "Quite a definite tensing of the muscles especially in the upper part of the body in the arms. Tendency to lift right arm and brush it away. Feeling was definitely U. Also during rubbing there was a tensing of the stomach muscles." F 49. "The feeling was U, very intense . . . A tendency to stiffen the muscles of the arm. That was a very slight feeling of stiffening of the arm—more like just tensing the arm." G 10. "At first there was tension and trifling surprise. During that time the feeling tone would be impossible to name; neither P nor U; exciting if you want to call it so; tensing if that is a feeling tone. Then the U which increased rather up to a maximum and then decreased a little. The U itself I can't say much about . . . A tension through my face." D 2. "That was U and exciting and perhaps somewhat tensing. The tension and excitement began before the first 'now' . . . The tension and excitement so far as I could tell were simply muscular feels in the cheek. The excitement was merely little contractions and quivers and that sort of thing. The U was many strains in a tendency to shake your head and get away from it—a frowning and possible tension through the body in the legs and arms as if to help you bear

it." D 5. "U, moderately strong . . . Something of the same kind of a shiver you get with the first reaction to cold. At the same time there was a general increase in the kinaesthetic tension, particularly noticeable in my chest, in my face and in my arms. In my chest there was kinaesthetic holding of my breath for a bit after a rather sharp inspiration. In my face there was kinaesthesia frowning and tensing all my face muscles. In my arm simply a special tension . . ." D 10. "U. The reaction was a kinaesthetic jump of my whole body. A sudden tension and then it was all over. I should say there was tension in my legs and tension in my chest and face strongest. There was frowning. Perhaps I should also add that there is a pretty strong tension in my neck is if to draw my head away." D 12. "Mildly U. General tension through chest and in face at first. The tension kept up in my face although I kept up breathing naturally . . . I think the general tension and the U both were even greater towards the end than towards the beginning . . . An increase of tension—general tension—after that." D 14.

Below are sample reports in which relaxation is correlated with P:

"P. I should say quite a bit more relaxation than in any other of the stimulus periods. I should call the pleasure the absence of kinaesthesia, the relaxation, the lack of opposing tension in the muscles." A 40. "Moderately P. A singular absence of kinaesthesia . . . I was thoroughly relaxed." A 55. "That had a forerunner of U. I was apprehensive. I was alarmed. I could feel the tension relax, particularly in the upper part of the head. My consciousness was next P by way of anticipation . . . The P I could find little basis for except absence of disturbing kinaesthesia." A 63. "Tension followed by relaxation and deeper breathing. All initiated before I had anything P except by ideational anticipation . . . Attention that accompanies your approach was rapidly followed by relaxation of the muscles and deeper breathing—P." A 66. "I don't know whether the P caused the relaxation." A 69. "That was P . . . The result was ease and relaxation which spread back and surrounded the violet (odor) without diminishing the degree of P which I had from the start felt from the violet." A 70. "It was moderately P. A feeling of relaxation. It tended to increase my relaxation." F 1. "That was a P odor. It tended to make me more relaxed—to stretch." F 17. "It had a calming effect; tendency to relax. Very P." F 23. "At first a little tension but the effect of the taste was calming, relaxing, soothing . . . It was moderately P." F 33. "It had a calming, soothing effect. A tendency to relax—was quite P." F 34. "Soothing, calming effect seemed to be localized in the front of the nose. A relaxing effect on the body. A tendency simply to let go. Very P." F 36. "A definite tendency to relax . . . It was very P." F 40. "Definite sensations from the central part of the chest. Produced a sort of diffused feeling. A slight tendency to relax. Moderately P." F 42. "Odor had a very soothing, calming effect. A tendency to relax—very P." F 45. "I believe a slight tendency to relax although it was approximately indifferent. A weak P feeling produced." F 47. "A slight tendency to relax. Weakly P." F 48. "Mildly P. Slight relaxation." C 8. "That is mildly P. It is relaxing, reminiscent." C 11. "P. Mildly P. A rather clean and clear and relaxing kind of a thing." C 15. "The feeling tone changed.

At first it was P and then tiresome At first a relaxation and various fleeting images but that all went before the end." C 16. "There was conscious relaxation, a breathing slower and deeper in an effort to give myself up to the smell. A fleeting wonder if I would have time for a second intake of breath. My judgment now is that it was mildly P, that I would have had the same P if I had relaxed and breathed more slowly and deeply without any smell." C 21. "When I realized that it was a smell there was the usual relaxation—deep, slow breathing I think the smells give me a kind of day-dream relaxation that is mildly P. I mean it is a P way to occupy your time till something more interesting comes up. You are simply passive." C 24. "That was P. There was a general relaxation, deeper breathing." C 30. "The P was a relaxing P rather than an exciting P." D 3. "I think of the experience in parts, and tend to report that the straining parts were U and the relaxing parts or moments were P." D 6. "Slightly P. I should say that the chief thing was a bit of relaxation very mildly felt through the chest and general muscular system, considerably more through my face." D 13. "P. Sort of a soothing effect. A tendency to relax." E 11. "That was P. I think there was a feeling of relaxation when I found it was the candy and not the vinegar." E 18. "That was P, fairly intense. I didn't observe any kinaesthesia. The soothing effect is a tendency to relax more." E 43.

The tendency for strain to occur with U and for relaxation to occur with P is by no means necessary and invariable. In the first place, we have several reports of strain and relaxation in which no mention is made of either P or U. In the second place, while the straining attitudes of anticipation, sensory preparation, attention, etc. are generally U in our data, there is no *a priori* reason why such strain should not occur simultaneously with P. The three reports (Table II) in which strain is associated with P are of this sort. In every case, however, the P is very weak, and there is no guarantee of strict simultaneity of strain and P.

"I should say it was very weakly P Tendency to tenseness of some of the facial muscles (related to the questioning attitude)." B 43. "I should say it was very faintly P. I didn't notice anything in the way of response other than a slight tensing of the muscles about the nose (related to olfactory attention)." B 45. "A very little tension in the muscles. It was P, I think, though not very much—a low degree." F 3.

In the third place, we have six reports in which the subject was asked to hold out the arm for 60 sec. In three cases the strain produced was U. In the other three, however, it was indifferent or "interesting." A laboratory attitude may make

a strain mildly agreeable! Hence the U is not intrinsic to the strain,⁴ for strain is not necessarily U.

From the above considerations we conclude that the association between strain and U, and between relaxation and P, is not necessary and invariable. In this it resembles the correlation-tendencies found by the expressive methods.⁵

Intensity of response in relation to P and U. Our data make it possible to investigate the relationship between intensity (or extensity) of bodily response and P-U. The reports contain (1) organic-kinaesthetic processes related to the affective reaction, (2) the corresponding feeling with frequent mention of its intensity. What is the relationship between P and U, of different intensities, and the number or amount of organic-kinaesthetic processes reported?

To answer this question we have given every report an 'organic score' which shows the number of separate organic-kinaesthetic processes reported. As this rating was in no case greater than four we adopted a five-point scale: 0 1 2 3 4. A few reports contain processes which apparently have no relation to the affective response, such as the incidental and accessory movements of chewing and swallowing, and random eye-movements. These movements, when reported, have *not* been included in the count and are *not* shown in the organic scores. Whenever there was any doubt as to the significance of the association between organic-kinaesthetic process and affective reaction, as in the case of heart-sensa-

⁴ We have a large number of reports showing the dependence of P-U upon mental attitude or "brain set." "If I take the laboratory attitude, it is P no matter how U it may be. It is either P or U according to my point of view." C 9. "One difficulty is from the attitude of being in a laboratory experiment. There is a mild P all the time. Most of the experience is P from that point of view." C 19. "Neither I guess but I haven't the slightest objection to your calling it mildly either . . . I can't tell you anything about the two judgments except that evidently I have different points of view." C 21. "Potentially U but again rather interesting and interesting things are intrinsically P." C 22. "I imagine that if I didn't like doing laboratory experiments, I'd spit out the vinegar and the fact that I do swallow it means that I like it from one point of view." C 27. "That was U, of course, but it was so mixed with interest that I hate to call it U. I don't want to call it U because I was distinctly interested." 32. "I imagine you could give me pretty disgusting odors and I'd find them P. They are interesting. It is interesting to get down into an odor." A 34. "In so far as it became interesting it wasn't U." A 49.

⁵ Leschke, Erich (Die Ergebnisse und die Fehlerquellen der bisherigen Untersuchungen über die körperlichen Begleiterscheinungen seelischer Vorgänge, *Archiv. f. d. ges. Psychol.*, 1914, 31, 30), finds an agreement of about 90% among previous investigators.

tions, chest-pressures, and the like, these processes *have been* included in the count. The organic score of a report, therefore, represents the number of probably significant organic-kinaesthetic processes reported. We have taken it as an index of the intensity or extensity of bodily response.

That there may be no misunderstanding as to the meaning of the organic score we give below a few examples of reports of every grade on our scale.

Reports with organic score of 0:

"Rather P. I couldn't detect any kinaesthesia there at all." E 20.

"Quite surprisingly U . . . I had expected something P because the same stimulus was P. I was surprised." A 20.

"That was P, quite P . . . The only kinaesthesia was that of the actual movements of chewing and swallowing." B 32.

Reports with organic score of 1:

"Very P and intense. A tendency to breathe deeply . . ." G 25.

"Rather U. A kinaesthetic tendency to pucker up my nose." E 22.

"U. . . a slight tendency to scowl—a tightening of the muscles about the eyes." B 12.

Reports with organic score of 2:

"Quite P. A calming, soothing effect, a tendency to relax. I wanted to inhale as much as I could. Organic sensations from the heart and chest, moderately diffuse . . ." F 34.

"Not so very U . . . I was aware of the usual pinching, withdrawing response. The whole situation was sufficiently marked to produce reverberations that accompany most of the U stimuli . . ." A 45.

"That was very U. A tension of the muscles, especially those of the face and mouth. The muscles in the rest of the body were also made more tense and I seemed to get that feeling of tension toward the stomach." E 8.

Reports with organic score of 3:

"Decidedly U. A definite jerking back of the head. Tightening up of the eye muscles—a closing of them. I was aware of circulatory changes localized in the spot struck and I should guess that there was a rush of blood to the face for that particular spot felt hot." B 23.

"Moderately U. The first tendency was to refrain from breathing. The second was to move my head away. There was also a tendency to contract the muscles about the nose and upper lip." B 49.

"It was rather relaxing at the most P part. At other times I think it was mainly exciting but not relaxing . . . It is true that there were curious little quivers and trembles and reverberations through my fist and it is true that there was a tendency to smile but it does not seem correct to say that they *were* the P but rather that they were the expression of the P as well as of the relaxation and the excitement." D 8.

Reports with organic score of 4:

"That was distinctly U. There was a foreperiod of straining apprehension and a kinaesthetic tendency to look up . . . The rap was very sharp and I felt a twitch throughout the length of my body . . . The reflex was followed by one of those warm waves that goes over you—an unpleasant keying up of the body . . . There was distinctly a vasomotor change . . ." A 41.

"That was very U. A tension of the muscles especially those of the face and mouth. The muscles in the rest of the body were also made more tense. I also seemed to get that feeling of tension down towards the stomach. I seemed to get a taste of the liquid in the œsophagus. It seemed to be something going down—U." F 8.

TABLE III
AVERAGE ORGANIC SCORES

Pleasantness				
	Weak	Average	Strong	No Report Intensity
Number of Reports.....	34	29	31	28
Their Total Organic Score.....	25	23	23	16
Average Organic Score.....	0.7	0.8	0.7	0.6
Unpleasantness				
	Weak	Average	Strong	No Report Intensity
Number of Reports	47	29	27	45
Their Total Organic Score.....	45	45	61	43
Average Organic Score.....	1.0	1.5	2.2	0.9
Indifference				
Number of Reports.....	70			
Their Total Organic Score.....	37			
Average Organic Score,.....	0.5			

Table III shows the average distribution of the organic scores. From it several conclusions may be drawn.

First, the average organic scores for U are in every case greater than those for P. If we take the total P reports as a class, we find an average organic score of 0.7 ± 0.6 ; the same for U gives 1.3 ± 0.7 ; and for I, 0.5 ± 0.7 . Although the

M.V.s are relatively large, indicating that the organic response has a considerable range of intensive variation, they are practically constant for all classes of report. The total number of reports upon which these averages are based is: P, 122; U, 148; I, 70 (Table I):

Secondly, the organic scores for U increase with the intensity of feeling. The more intense the feeling, the more widespread is the bodily reaction. For P, on the other hand, no such relationship appears. The average organic scores for P are practically constant for all intensities and classes of P. The 31 reports of intense P have exactly the same average score as the 34 reports of weak P.

Thirdly, the average organic score for the reports of indifference is less than any score for P or U.

When no intensity is reported the organic scores lie midway between weak feeling and indifference, and we hazard the guess that the feeling-intensity of this class of reports is, on the average, very weak. As the intensity of P and U decreases, the organic scores approach that of I.

We should note that relaxation is included in the organic scores of P as a significant process. Some of our subjects describe relaxation as the "letting up of strain," "the absence of kinaesthesia," *i.e.*, they tend to regard relaxation negatively as the release of strain.⁶ Suppose that we assume that relaxation is negative, merely the release of strain, and on the basis of this assumption eliminate relaxation from the organic scores. If we do this, the organic scores for P become equal to that of indifference. Hence, with our data, P is differentiated from indifference primarily by relaxation, which itself is negative and represents a return to indifference (from one point of view) rather than a departure from it.

If, for the sake of comparison, we eliminate strain from the U reports, the average organic score is reduced from 1.3 to 1.1; and the latter is well above indifference (0.5).

⁶ Shepard, John F., Organic Changes and Feeling, *Am. Jour. of Psychol.*, 1906, 17, 522 ff. "Strain is described as composed of sensations from the muscles, the backflow from the acting muscles, particularly those of accommodation of a sense organ. . . . Relaxation seems to be a release from either strain or excitement." Cf. Titchener, E. B., Zur Kritik der Wundt'schen Gefühlslehre, *Zeits. f. Psychol.*, XIX, 1899, 321 f. Our result confirms the later polemical work against the Wundtian theory as regards the nature of strain and relaxation.

TABLE IV

AVERAGE ORGANIC SCORES WITH CUTANEOUS STIMULI ELIMINATED

Pleasantness				
	Weak	Average	Strong	No Report Intensity
Number of Reports.....	34	27	29	28
Their Total Organic Score..	25	20	23	16
Average Organic Score.....	0.7	0.7	0.8	0.6
Unpleasantness				
	Weak	Average	Strong	No Report Intensity
Number of Reports.....	38	13	11	23
Their Total Organic Score..	35	17	27	15
Average Organic Score.....	0.9	1.3	2.4	0.65
Indifference				
Number of Reports.....	55			
Their Total Organic Score.....	27			
Average Organic Score.....	0.5			

It may be objected that the foregoing result is due to the selection and balance of stimuli. The cutaneous stimuli (slaps, pinches, etc.) were for the most part U while we had no stimuli capable of evoking correspondingly intense P. Had we used other stimuli and more intense P situations the differences of the curves might disappear.

To test this criticism we have eliminated all cutaneous reports and worked out average organic scores for the remaining odors, tastes, and chords (Table IV). We believe that simple odors, tastes, and chords are comparable from the affective standpoint. The elimination of cutaneous stimuli reverses the P-U balance (P 118; U 85. See Table I). However, the conclusions still stand; the differences are even

clearer than before. The U curve is steeper. Consequently the presence of a relatively large number of U cutaneous stimuli does not account for the differences in the organic scores.

As regards intensity, we have no means of comparing P with U. We do not know whether the "intense P" of a perfume is equal to the "intense U" of caproic acid, and whether the "moderate P" of peppermint-candy is comparable with the "moderate U" of vinegar. It would be worth while to study these organic curves at higher levels of feeling-intensity. We may conjecture that the P curve would rise slightly and gradually, and that the U curve would rise suddenly and abruptly to a point much higher than the most intense P would reach.

We should note, however, that the relative numbers of "weak" "average" and "strong" Ps and Us are about the same (Table III). The intensive balance of our reports is very good.

Fundamental characteristics of the unpleasant response. An analysis of our data brings out several fundamental characteristics of the U response.

First, there is the well-known tendency to withdraw oneself from the stimulus-object, either reflexly or deliberately.

"Much the strongest avoidance impulse so far . . . It was all I could do to keep from brushing it away." A 38. "U. Quite a definite desire to withdraw and prevent one's face from being damaged." A 64. "A decided tendency to draw my head back which was not inhibited in this case." B 15. "I got away from it. The kinaesthesia was a definitely overt action." B 28. "Slightly U. I reduced the intensity of the sensation by drawing my head away." B 37. "U, strong. A tendency to shut off the breathing—to reduce it. Tendency to draw head away . . ." B 42. "Moderately U. The first tendency was to refrain from breathing; the second was to move my head away." B 49. "The head was jerked aside with the blow. It was moved to the left." G 32. "A very strong tendency to turn the head away from the odor." F 14. "First just a little start or shock. A tendency to draw the head up and back away from the spot rubbed." F 30. "Immediately there was a tendency to jerk my head away and to push away with my right hand." F 35. "A great deal of kinaesthesia particularly in my eye-lids as if protecting my eyes from a blow and a general tendency to shrink away." C 2. "A tendency to stop up my ears and to draw away from the stimulus." C 9. "The U was many strains in a tendency to shake your head and get away from it—and frowning and possibly a tension through the body in legs and arms as if to help you bear it." D 5.

Secondly, closely related to the above is the tendency to put the object away from oneself or to prevent its action. Bio-

logically this type of response has the same purpose as the above.

"Provoked kinaesthesia of pushing the stimulus away—in the left arm in particular." A 19. "It was all I could do to keep from brushing it away." A 38. "The organics of an odor like that lead one to reflexes of repulsion." A 42. "U. Quite a noticeable tightening of the muscles in the lower part of the face. It seemed to be the reverse of sniffing—an attempt to prevent air from coming in. If I'd been wholly natural, I'd have closed the nostrils with my hand." B 25. "U, rather strong intensity. I got a movement of my intestines, a sort of nausea. It was an expulsive movement preliminary to vomiting." E 51. "I had a tendency to move my mouth to blow it away. It was disgusting. I thought I got a little nausea." E 56. "A tendency to lift up the right arm and brush it away. Tensing of neck and jaw muscles." F 49. "A tendency to stop up my ears and a tendency to draw away from the stimulus." C 9. "I tended to spit it out. Then the laboratory attitude came back . . . If you get too naive and too relaxed you have a physical reaction and nothing else. I think that time I would simply spit it out." C 14. "I am perfectly sure that under other circumstances I should have actually reached up and knocked away the stimulus from my chin." D 10.

Thirdly, there is a tendency to inhibit or resist (frequently due to the experimental situation) some normal response to the stimulation.

"A tendency to keep it in my mouth rather than to swallow it." B 18. "U. There was a much weaker tendency to resist smelling than in the other case. Only a slight tendency to tighten the muscles about the nostrils to the extent that it interfered with breathing." B 27. "I tended to inhibit the movement of swallowing. I think there was some tenseness about the nose and throat which may have been connected with my inhibiting of the swallowing." B 47. "The first tendency was to refrain from breathing. The second was to move my head muscles and to hold the head in position against any increase in pressure." B 15. "There was some resistance to swallowing although it was swallowed." G 20. "A tendency to resist the stimulus." E 27. "Slight stiffening of the neck to hold the head rigid as the friction was increased." G 18. "A slight tendency to shut out the noise . . . to put my fingers in my ears." G 30. "There was a movement in my cheek muscles and my facial muscles producing a frown and a reaction against the stimulus in the opposite direction." E 48. "There was a rivalry between the tendency to move the head away and to hold it there." E 61. "Kinaesthesia was localized in my chin—a resistance to the rubbing. A tendency to pull away from the placed rubbed." F 6. "I had to force myself to hold the chin still. A tendency to withdraw my chin from the rubbing." F 9.

Muscular strain or tension is frequently present in the form of anticipation of a U stimulus. From one point of view such strains may be regarded as the resistance to an expected undesirable situation.

Fourthly, the unpleasant response is accompanied by reflex twitchings, convulsive contractions, and bodily reverberations of various sorts, especially when the stimulus-object is presented suddenly and there is an element of surprise.

"At first a bit of suspense; then I jumped (marked reaction). Consciousness was empty there and the first thing I remember was the sensation from the jump . . ." C 10. "No feeling tone at first during the violent reaction, the jump. Then it began to tingle . . . There was a desire to slap back." C 25. "A little shiver of what one might call revulsion went through me. The shiver itself seemed to start in my chest and go even down into my legs. It was something the same kind of a shiver you get with the first reaction to cold." D 10. "The reaction was a kinaesthetic jump of the whole body. A sudden tension and then it was all over (S's face seen to twitch)." D 12. "At first a little shock. I didn't expect the sounds. It seemed to be spread down toward the fingers, the arms." F 3. "A slight jar or shock at the beginning of the playing. The shock was felt in the heart and chest." F 16. "A sudden start. A sudden tension of the muscles as soon as you struck me." F 4. "Quite a definite tensing of the diaphragm and a jump in the hand which tapered off rapidly." A 7. "Distinctly U. It starts reflex twitchings in every part of the body, particularly in your hands but also in your head and around your ear. Quite a mass of tendencies to react." A 22. "At first a start that is so reflex that it is done for you. Then after a slight pause the wave of sensation. It is a wave coming from my feet and rises higher and higher and then recedes." A 26. "Quite decidedly U. I very distinctly felt my heart give a thump. There was a wave-like twinge that goes up your back. This time I was conscious of it going down my right leg." A 36. "I felt a twitch throughout the length of my body. The reflex followed by one of those warm waves that goes over you—a keying up of the body." A 41. "The whole situation was sufficiently marked to produce reverberative reflexes that accompany most of your U stimuli." A 45. "I felt movement down my neck and chest as well as on my cheek (marked reaction)." E 33. "I had a movement in the pit of my stomach right beneath the floating ribs." E 39. "U, very intense. I got movement in my neck and facial muscles, twitchings (seen)." E 52. "There was a feeling as if perspiration came out. A muscular reaction—movement of the head." E 79.

Summing up the characteristics of the unpleasant response we may say that, first, there is a tendency to react away from the stimulus-object; secondly, a tendency to put the stimulus-object away from oneself or to prevent its action; thirdly, a tendency to inhibit or resist the normal response (tension); fourthly, bodily twitches, shocks, waves of sensation, and other reverberative reflexes.

Analysis of the P response.—While U is associated with a large variety of reflex movements, P is passive and negative. Our data do not contain a single case of active reflex response to a P stimulus. With U there are withdrawing

movements, frowning, straining, reflexes of expulsion, etc. while P is characterized by mere acceptance of the situation and the passive yielding to it.⁷ Also the bodily reverberations which are associated with U (twitches, shocks, waves of sensation, etc.) are entirely absent from the P reports. U is organically positive and active while P is negative and passive. This general finding brings into relief the significance of relaxation. Muscular relaxation is the typical process associated with P and, so far as our data go, both qualitatively and quantitatively, differentiates P from indifference. Relaxation itself is negative and passive, a letting-up of strain.

The traditional relation between P and seeking movements finds little support in our reports, while that between U and withdrawal is abundantly confirmed. The entire evidence for seeking movements, as 'expressions' of P, is found in 11 reports, in which the subject "sniffed," "took a deeper breath in order to get more," "held the breath," etc. In every case these seeking movements are deliberate and never reflex like most of the withdrawing movements of U. It is a question to what extent and in what sense voluntary, deliberate behavior based upon the knowledge that P may be produced or prolonged, or U avoided, can be considered an 'expression' of feeling.⁸

CONCLUSIONS

Let us now ask the original question: is there any characteristic difference between the organic factors of P and U feeling which may throw a light on the physiological mechanism of affection?

I. A study of the processes reported by the subjects shows that there is no organic-kinaesthetic *sine qua non* of affection. P and U are reported in more than a third of the cases without any mention of organic-kinaesthetic processes; and when

⁷ "I was willing to have the thing continued." A 4. "A relaxing effect on the whole body. A tendency simply to let go." F 36. "It is the kind of a thing you want continued." C 16.

⁸ If we look at the question theoretically, it is clear that in many cases seeking movements are expressions of U: strong hunger, for example. The situation is complicated by the fact that the total seeking activity may become P, as when prey is sighted or food smelled. With the seeking movements of sex there is room for argument. Unsatisfied and unrestrained desire is probably U when associated with seeking. However, there may be vaso-dilatation, general relaxation, anticipatory imagery, etc., so that the total activity of seeking is P. Since positive seeking movements may be associated with either P or U, the traditional coupling of P with seeking is unsatisfactory.

such processes are reported, they bear no fixed and invariable relationship to the affections. However, a number of tendencies toward correlation can be made out, and of these the most probable is that between muscular strain and U and muscular relaxation and P.

II. A statistical study of the organic-kinaesthetic processes in relation to affection and an analysis of the reports themselves bring out the fact that: U is associated with a positive bodily response which becomes more intense and widespread as the feeling becomes stronger, while with P the bodily response is relatively slight. When one reacts away from the stimulus-object, or puts it away from oneself, or resists it (strain), or when bodily 'reverberations' are present, U is apt to be felt. P, on the other hand, so far as our data go, is organically-kinaesthetically negative. P is felt when one relaxes, or simply 'does nothing;' there are no reflex responses to the stimulus-object and no bodily 'reverberations.'

It should be remembered that any result is a function of conditions. Our subjects were seated quietly in a Morris chair, instructed to be "passive and receptive" and "to let the experimental situation have its full normal effect." In one of the earlier instructions they were asked to "make no resistance to the stimuli; to let them have their full effect." The *Aufgabe*, therefore, was to accept the stimuli calmly and quietly, or else as one does in ordinary life. With this set simple odors, tastes, tactual impressions, and a few chords and discords were presented. Those responses which are described as U involve a positive reaction which is absent with P.